Ch. 16 – Intro. to Probability

e.g. ① $P(\text{"Heads-Up" for 1 toss of a fair coin}) = \frac{1}{2} = 0.5 = 50\%$

(# of ways to get "H" ↓ ; # of possible outcomes (i.e. "H" or "T") ↑)

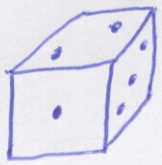
② $P(\text{"5 up" for 1 roll of a fair die}) = \frac{1}{6}$

(only 1 "5" ↓ ; # of possible outcomes ↑)

$= 0.1\overline{6}$

$= 16.\overline{6}\%$

$\approx 16.7\%$



$0 \leq P(x) \leq 1$

↑ Impossible Events (0%)

↑ Certain Events (100%)

$\frac{1}{6} \Rightarrow$

$0.166\ldots = 0.1\overline{6}$

$6\overline{)1.000}$

$-6\downarrow$

40

$-36\downarrow$

40

-36

4 ...

$= 16.\overline{6}\%$

$\approx 16.7\%$

In General

$P(A)$ = Probability of Event A

$$\Rightarrow P(A) = \frac{\#\text{ of ways "A" can occur}}{\text{Total \# of possible Outcomes}}$$

provided each outcome is equally likely.

The Sample Space of an "Experiment" is the set of all possible outcomes.

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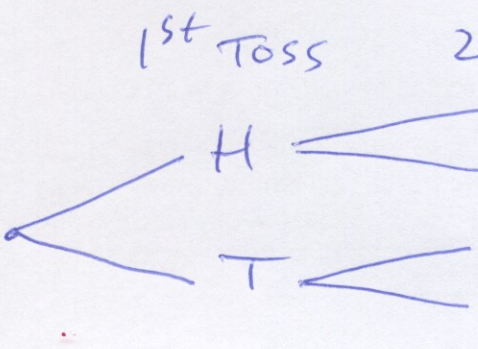
e.g. ① The Toss of an ordinary coin. $\Rightarrow \{H, T\}$

② The Toss of an ordinary coin twice: $\{HH, HT, TH, TT\}$

Tree Diagram



a) $P(HH) = \frac{1}{4} = 0.25$

b) $P(1H \text{ \& } 1T) = \frac{2}{4} = \frac{1}{2}$

(3) Now we roll a pair of ordinary 6-sided dice.

a) List the Sample Space.

(x, y)

$\uparrow$ $\uparrow$

1st Roll, 2nd Roll

1st \ 2nd	1	2	3	4	5	6
1	(1,1)	(2,1)	(3,1)	(4,1)	(5,1)	(6,1)
2	(1,2)	(2,2)	(3,2)	(4,2)	(5,2)	(6,2)
3	(1,3)	(2,3)	(3,3)	(4,3)	(5,3)	(6,3)
4	(1,4)	(2,4)	(3,4)	(4,4)	(5,4)	(6,4)
5	(1,5)	(2,5)	(3,5)	(4,5)	(5,5)	(6,5)
6	(1,6)	(2,6)	(3,6)	(4,6)	(5,6)	(6,6)

$\Rightarrow 6 \cdot 6 = 36$ possible outcomes

b) $P(\text{sum} = 7) = \frac{6}{36} = \frac{1}{6} = 0.1\overline{6} \approx 17\%$

c) $P(\text{sum} \geq 10) = \frac{6}{36} = \frac{1}{6} = 0.1\overline{6} \approx 17\%$

d) $P(\text{sum} = 11) = \frac{2}{36} = \frac{1}{18} = 0.0\overline{5} \approx 5.6\%$

e) $P(\text{sum} \leq 5) = \frac{10}{36} = \frac{5}{18} = 0.2\overline{7} \approx 27.8\%$